

REMARKS

Reconsideration and allowance of the subject application in view of the foregoing amendments and the following remarks is respectfully requested. Entry of the above amendments is requested under Rule 116 because they are directed to overcoming § 112 issues and are such as to place the application in condition for allowance.

IDS Acknowledgment

The Examiner is courteously requested to acknowledge the IDS that was submitted on October 26, 2006 and again on October 30, 2006, in any subsequent action taken.

Claim amendments/Status

Claims 43-54 and 56-77 remain pending in the application with claims 56-71 and 73 withdrawn from consideration. Claim 43 has been amended in a manner which clarifies the subject matter for which patent protection is sought. Entry of these amendments is requested in that, as noted *supra*, they are directed to overcoming issues raised under § 112.

Rejections under 35 USC §§ 112, 102 and 103

The rejections of:

- 1) claims 43-54, 72 and 74-77 under 35 USC § 112 as allegedly failing to comply with the enablement requirement;
 - 2) claims 43-54, 72 and 74-77 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Daly et al. (US 6,120,688); and
 - 3) claims 43-54, 72 and 74-77 under 35 U.S.C. 102(b) as being unpatentable over JP 05-201872 or Lawhon et al. (US 4,643,902) with evidence from Gobel et al. (US 4,491,600) and/or Dorai et al. (US 5,434,315); are
- respectively traversed.

The Examiner has advanced that the claims do not describe the invention in such a way so as to enable the skilled person to make and/ or use the invention. The Applicants submit that amended claim 43 is fully supported by the description. In claim 43, it has been clearly identified that one or more solenoid valves have been placed and configured to connect the membrane module with extract container, water reservoir and air compressor selectively in concentrate, drain and wash mode. The skilled artisan by reading the revised claim with the description

(particularly, paragraphs 70, 71 and 72 and paragraphs 111, 112 and 113 of the specification) can easily identify that how the one or more solenoid valves are structurally linked in the system. Therefore, the Applicants believe that the revised claims are enabled by the disclosure.

In connection with the rejection of claims 43-54, 72 and 74-77 as being either anticipated or obvious over Daly et al. the Applicants respectfully submit that Daly discloses a method and apparatus for producing drinking water from impure or contaminated water. The object of Daly is completely different from the object of the present invention. Although Daly uses a reverse-osmosis membrane, the focus of Daly is on permeated product (i.e. pure water) as the product which is on low pressure side. Whereas, the object of the present invention is to concentrate the aqueous solution of herbal extracts. The focus of the present invention is on the concentrate or on the high pressure side of the membrane.

Therefore, the apparatus disclosed by Daly is not capable of concentrating an aqueous solution. The Examiner has indicated that Daly discloses individual components such as reverse osmosis membrane with a pre-filter, solenoid valves, process tanks and pumps. The Applicants respectfully indicate that Daly does not provide any teachings which would motivate a skilled person to construct an apparatus or device which can concentrate solutions.

Daly does not disclose the construction of the membrane module and its interlinking with one or more solenoid valves which can selectively connect the membrane module with the extraction tank, air compressor and water reservoir.

Further, the present invention differs from Daly in the sense that the device can speedily remove more than 80% of the water and prevent degradation of temperature sensitive bioactive molecules from the aqueous plant extracts at ambient temperature. That is to say, the claimed device requires no heating or cooling elements and workable at room temperature.

Moreover, the cited US patent neither teaches nor solves the technical problems related to the speedy removal of water from the aqueous extracts of plant without degradation of bioactive molecules. Therefore, the cited US patent has limitations which can be circumvented by the claimed arrangement.

The claimed device is suitable for effective concentration of herbal extracts, as the same time retaining all the important constituents and bioactive compounds in the concentrate. Furthermore, it has advantage for automatic washing of membranes and thus minimizes the

problems of membrane bio-fouling. These features are not the mentioned in any of the prior art cited.

The Applicants would like to indicate that the system disclosed by the Daly reference is neither operable for concentrating aqueous solution of herbal extracts nor does it provide any teachings which can motivate a skilled artisan to arrive at the present invention. Therefore, the Applicants do not agree with the Examiner's position that the apparatus or device of the claimed invention with the limitation of "for concentrating aqueous solutions of herbal extract" is only intended use. The device of the present invention is specifically constructed for effective and speedier concentration of the herbal extracts. To make this even more evident the preamble of claim 43 has been amended to call for "A membrane-based concentrating device for . . . "

MPEP 2111.02 states that:

Any terminology in the preamble that limits the structure of the claimed invention must be treated as a claim limitation. (Emphasis added)

In this situation the statement "for concentrating an aqueous solution herbal extract" reinforces the structural requirement that the device is "a membrane-based concentrating device."

Therefore, the present invention should not be considered as obvious over the cited prior art.

In connection with the rejection of claims 43-54, 72 and 74-77 as being obvious in view of JP 05-201872 or Lawhon (US 4643902) with evidence from Gobel et al. (US 4491600) and/or Dorai et al. (US 5,434,3015), the Applicants submit that:

a) JP 05-201872 (hereinafter "JP") discloses a process for the concentration of crude vegetable compounds by a reverse osmosis process. JP discloses a process which utilizes commercial cellulose acetate membranes. In the concentration process disclosed by JP, pH is to be adjusted between 3 to 9 using acid or alkaline solution before hand i.e. before reverse osmosis process (see para 0006 last 5-6 lines). JP also discloses that reverse osmosis process is usually performed under the pressure in the range of 1 to 60 Kg/cm² and under the temperature preferably 0 to 85°C (para 0006 last 2-3 lines).

Whereas, in the present invention no pH adjustment is required for the concentration of the aqueous herbal extract. The present invention uses a polyamide thin composite membrane having NaCl rejection greater than 95%. JP does not disclose or provides any teachings with regard to the construction of the device for concentration of herbal extracts (greater than 80% concentration). JP discloses a process not an apparatus. The cited document also does not disclose the construction of the membrane module and other components of the device of the present invention. Further JP does not disclose one or more solenoid valves which can be used for selectively connecting the membrane or membrane module with the extraction chamber, air compressor and water reservoir.

Further, the embodiments of the claimed invention discloses the concentration of the solutions at the operating pressures of around 5-6 kg/cm² in order to avoid pressure impact on the sensitive natural compounds. Whereas JP mentions that concentration of the extract has been carried out at 1-60 kg/cm² which is a broad range and can not be considered as an RO process alone.

b) Lawhon discloses a method of ultra-filtration which is employed to preferentially pass an ultra-filtration permeate containing flavor and aroma components while retaining spoilage micro-organisms in UF retentate (see Abstract, first three lines).

Lawhon discloses a process of removal of unwanted microorganisms from fruit juice using a UF membrane process. In the invention disclosed by Lawhon the reverse osmosis process is used to concentrate flavor and aroma components before recombining them with the treated UF retentate (see column 5, first five lines). Lawhon discloses that the UF retentate is concentrated by evaporation concentration employing sufficient temperatures (see column 5 lines 65 +). The RO permeate is used as ultra-filtration water to enhance the movement of the low molecular weight components (see column 6, lines 50 to 55).

Further, Lawhon discloses that absence of RO processing steps reduces the cost of the process (see column 7, lines 16 to 20).

It can be clearly understood that the focus of invention disclosed by Lawhon is on the UF retentate and that the RO process is employed to increase the amount of the aroma and flavor components in the UF retentate.

By analyzing figures 1 to 3 of Lawhon one can clearly understood that the reverse osmosis is used a preferred feature and not as an essential feature (e.g. se figure 3).

Whereas, the present patent discloses a device wherein spiral module of thin film composite reverse osmosis membrane having NaCl rejection of greater than 95% has been used for speedier concentration of aqueous herbal extracts at room temperature by recycling retentate continuously. Lawhon does **not** disclose any construction of the device for concentration of aqueous solution of herbal extracts using reverse osmosis. Rather, the cited document (Lawhon) discloses a system of ultra-filtration for removing micro-organisms while retaining aroma components.

The cited document does **not** disclose any feature which would motivate the skilled person to arrive at the construction of the device for concentrating aqueous solution of herbal extract at room temperature and with 80% water rejection. The present invention (as claimed) provides a specific construction of the membrane module. Further, Lawhon also does **not** disclose along with other features of the present invention one or more solenoid valves which can be used for selective connecting the membrane or membrane module with the extraction chamber, air compressor and water reservoir.

The claimed invention specifically provides a device, as explained in the specification, for the concentration and purification of aqueous extracts at ambient temperature and moderate applied pressure whereas, the cited reference does **not** teach either the device or the concentration aspects. Moreover, the present invention uses spiral modules which have several advantages in terms of higher output, lesser space and low energy consumption compared to the tubular membranes reported by the Lowhan et al.

c) Gobel discloses a process for the concentration of temperature sensitive components using the steps of ultrafiltration, reverse-osmosis and freeze concentration. Particularly, the cited document discloses a process for the separation of high molecular weight unwanted enzymes and other materials from fruit juice by fractionation of using ultrafiltration membranes having specific molecular weight cut off value. In this process, low molecular weight vitamins, aroma, color materials, etc., passes through the high cut off value membrane whereas the high molecular weight proteins and enzymes are rejected. Gobel does **not** teach in any way the concentration of low molecular weight aqueous extracts.

Further, the present invention discloses a device with a spiral RO module with a spiral thin film composite membrane for the concentration of aqueous herbal extracts at room temperature by recycling retentate continuously in a single step. It differs from Gobel wherein

two steps are involved: i) purification of the juice by UF membrane and ii) concentration of UF permeate by freezing at low temperature and removing the ice crystals. The process disclosed by Gobel requires more time and energy as it involves two steps of fractionation and low temperature freezing and crystal separation manually.

The module type disclosed by Gobel (column 3, lines 55-60) is for ultrafiltration equipment which is to be operated under a pressure of 1 to 10 bar (see column 3, lines 58 to 60). The cited document (Gobel) does **not** disclose a spiral thin film composite RO membrane (as disclosed by the present invention) which is to be operated at low pressure (say 5 to 6 Kg/cm²). Further, Gobel discloses (in column 4, lines 5 to 21) that the separation of higher molecular weight components is done in the ultrafiltration and (if desired by reverse osmosis) and lower molecular weight components is subjected to the freeze concentration cycle. The cited document (Gobel) does not disclose the concentration of low molecular weight aqueous extracts.

Also, the Gobel reference does **not** disclose or provide any teachings with respect to the construction of the device which is suitable for concentrating aqueous solution of herbal extracts.

To achieve the desired concentration Gobel relied on ultrafiltration step and the freeze concentration step. Gobel clearly indicates that if desired, reverse osmosis step can be included in the process as one concentration step.

Gobel does not disclose or provide any teachings which motivate a skilled person to construct a device which provides speedier concentration of the aqueous solution of herbal extracts.

US Patent No. 5,434,315 to Dorai et al. (hereinafter Dorai) discloses a process for the fractionation of polyether glycols of different molecular weight distribution using ultrafiltration membranes of different molecular weight cut off values. It does **not** teach in any way the concentration of low molecular weight aqueous extracts. The present invention differs from the said patent in the following aspects.

The claimed invention discloses a device wherein spiral module of reverse osmosis membrane having NaCl rejection of 95% has been used for the concentration of aqueous herbal extracts at room temperature by recycling retentate continuously. Water and very low molecular

weight solutes passes through the membrane at a considerably low operating pressure than the commercial RO membranes which have NaCl rejections of >99%.

The UF membranes used in Dorai have very high molecular weight cut off values than the solutes present in the herbal extract and are not useful for concentration of extracts. Whereas, the membranes of the present invention have the capability to concentrate the low molecular weight extracts.

Dorai does not disclose or provide any teachings of the construction of the device of the present invention.

As explained *supra* the JP document teaches concentration of crude vegetable components using reverse osmosis and by adjusting the pH 3 to 9 of the solution beforehand at a temperature preferably 0 to 85°C. Whereas, Gobel teaches concentration by ultrafiltration and freeze concentration and if desired by reverse osmosis. The teachings as evidenced by the two documents are technically non combinable. If the teachings of these two documents are combined the person skilled in the art can not arrive at the construction of the device as claimed. As will be appreciated, the reverse osmosis membrane is used for different types of application in Lawhon and Daly, e.g., retaining the aroma components (in Lawhon) and for purifying water as (in Daly). The entirely different application and objects renders the teachings of Daly technically non-combinable with the teachings of other cited prior art.

The present invention relates to a device for concentration of aqueous solution of herbal extracts. The construction of the device along with other features includes specific construction of membrane module with the spiral thin film composite membrane and one or more solenoid valves for selectively connecting the membrane or membrane module with the extraction chamber, air compressor and water reservoir.

The Applicants believe that by no stretch of imagination could the teachings of the cited prior arts can be combined to arrive at the claimed subject matter.

Therefore, the claimed invention is submitted to be novel and inventive in view of the cited prior art.

In connection with claims 74-77, it is not so clear that rendering the arrangements which are disclosed in the cited art could be rendered sufficiently compact as to be portable. Indeed, the only suggestion of such a structure is the Applicants' claims. If such a process is well known as purported, then the Applicants seasonably challenge the same under MPEP 2144.03.

The Examiner is requested to produce a reference or some form of evidence which renders it obvious that the cited art and/or the purportedly obvious result of the combination of said art, could be rendered portable to the degree that six solenoids such as purportedly obvious in view of cited art, could be disposed in housing which is portable.

Conclusion

All objections and rejections having been addressed, it is respectfully submitted that the application is in condition for allowance and a Notice to that effect is earnestly solicited.

The Examiner is invited to telephone the undersigned, Applicant's attorney of record, to facilitate advancement of the present application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,
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